

REMARKS

Initially, Applicants would like to thank the Examiner for acknowledging Applicants' claim for foreign priority under 35 U.S.C. §119, as well as receipt of certified copies of each of the priority documents upon which the claim for foreign priority is based. Applicants would further like to thank the Examiner for acknowledging consideration of each of the documents listed on Form PTO-1449 submitted with the Information Disclosure Statement filed on February 27, 2006. Finally, Applicants would like to thank the Examiner for indicating the allowability of the subject matter recited in claims 15-20 and 22-24, if amended into independent form to include all of the limitations of base and any intervening claims.

In the outstanding Office Action, Figure 1 was objected-to under MPEP 608.02(g) as lacking a designation such as --Prior Art--. Attached hereto, Applicants are submitting a Replacement Figure 1, labeled --Prior Art--. In view of the attached replacement sheet of drawings, reconsideration and withdrawal of the objection to the drawings is requested.

The specification was objected-to for informalities on pages 3 and 8. Applicants have amended the specification at page 3, line 18 to replace the phrase "has following" with --has the following--, and at page 8, line 6 to replace the word "though" with --through--. Accordingly, reconsideration and withdrawal of the outstanding objections is requested.

Claims 15-20 and 22-24 were objected-to as being dependent upon rejected base claims, but were otherwise indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants

have not so rewritten the objected-to claims, as they each depend, directly or indirectly, from an allowable amended independent claim 1, as discussed below.

Claims 1, 2, 5 and 8-10 were rejected under 35 U.S.C. §102(e) as being anticipated by HARRAH et al. (U.S. Patent No. 6,498,355). Claims 3, 4 and 6 were rejected under 35 U.S.C. §103(a) as being unpatentable over HARRAH in view of SCHNEIDER (U.S. Patent No. 5,172,301). Claim 7 was rejected under 35 U.S.C. §103(a) as being unpatentable over HARRAH in view of SCHNEIDER, and in further view of SUGAYA et al. (U.S. Patent No. 6,784,530). Claims 11-14 were rejected under 35 U.S.C. §103(a) as being unpatentable over HARRAH in view of MASAHIRO (JP 358201383). Claims 21 and 25-28 were rejected under 35 U.S.C. §103(a) as being unpatentable over HARRAH in view of TSUJI et al. (JP 404048740).

Upon entry of the present amendment, claims of the present application will have been amended to eliminate noted informalities. Additionally, claim 1 will have been amended to more clearly recite features of the patentable subject matter to which the pending claims are directed, while not substantially affecting or narrowing the scope of the claims. In particular, claim 1 will have been amended to recite “a submount comprising a mount base made of an electrically insulating material”, as well as “wherein the mount base comprises a recess, said at least one light-emitting diode chip is mounted on a bottom of the recess.”

The herein-contained amendments should not be considered an indication of Applicants' acquiescence as to the propriety of any outstanding objection or rejection. Rather, Applicants have amended the pending claims in order to expedite prosecution of the present application and obtain early allowance of claims.

The Office Action relied upon HARRAH as teaching electrically conducting lines formed on the mount base connected electrically to the light-emitting diode chip as recited in claim 1. In this regard, HARRAH teaches LED 28 attached to submount 30 as well as electrically conductive traces in trace layer 8. The Office Action also cited portions of HARRAH teaching top N-Contact 34 and top P-Contact 36 of LED 28 as teaching the electrically conducting lines recited in claim 1.

However, the cited portions of HARRAH teach vias 38 and 40 carrying current from top N-Contact 34 and top P-Contact 36 of LED 28 to bottom N-Contact 42 and bottom P-Contact 44, respectively. HARRAH further teaches bottom N-Contact 42 and bottom P-Contact 44 being electrically connected to traces in trace layer 8. Neither the traces nor the LED contacts are formed on submount 30. Rather, HARRAH teaches traces in trace layer 8 that are physically connected to LED contacts 42 and 44. In another embodiment shown in Figure 3 of HARRAH, wire bonds 48 and 50 indicate that LED 28 and submount 30 are connected to trace layer 8 through an intermediary and are not electrically conducting lines formed on submount 30. More particularly, if HARRAH were to teach electrically conducting lines formed on submount 30, wire bonds 48 and 50 would be rendered superfluous.

In any case, by the herein-contained amendments, claim 1 has been amended to recite that the mount base has a recess, that the at least one light-emitting diode chip is mounted on a bottom of the recess, and that the mount base is made of an electrically insulating material. These features are shown, by way of example, in the embodiment of Figure 2 in the present application. As a result of these amended features, heat generated in the LED chip can be transferred efficiently through the mount base because either the

thickness of the mount base from the recess to a face of the mount base opposing the recess can be decreased in comparison to a mount base without the recess, or the distance from the LED chip on the recess to the metallic plate can be decreased in comparison to a mount base without the recess. Further, heat from the LED chip to the mount base can be transferred more efficiently using an LED chip with P and N electrodes formed on one face mounted to the recess with flip chip bonding. Additionally, light efficiency can be improved because the light emitted by the LED chip from a side thereof can be reflected by an inner side of the recess to the front direction by forming the side face of the recess with an appropriate shape. Finally, the light from the LED chip can be taken out to the front side effectively because electrodes through which the light does not transmit substantially are not present in the front side.

The cited portions of HARRAH do not teach or suggest a submount comprising a mount base made of an electrically insulating material, nor a mount base comprising a recess, nor at least one light-emitting diode chip mounted on a bottom of the recess, as recited in amended claim 1. Rather, in Figure 2, HARRAH shows submount 30 having a flat profile, upon which LED 28 is mounted on an exposed portion over the flat metallic substrate 6. HARRAH also shows, in Figure 2, thermally conductive material 24 placed between thermal contact 46 and flat metallic substrate 6. Because the thermally conductive material 24 embeds the space between the submount 30 and the metallic substrate 6, the thermally conductive material requires a thickness similar to that of the dielectric layer 10. This structure of Figure 2 in HARRAH is similar to the structure shown in the embodiments of Figures 3 and 4 in HARRAH.

As set forth above, HARRAH does not disclose, suggest or render obvious the light-emitting device recited in independent claim 1. Accordingly, independent claim 1 is allowable over HARRAH. Accordingly, reconsideration and withdrawal of the rejection of claim 1 under 35 U.S.C. §102(e) is respectfully requested.

Claims 2-28 are each allowable at least for depending, directly or indirectly, from allowable independent claim 1, as well as for additional reasons related to their own recitations.

For example, the Office Action cited HARRAH as teaching said submount is bonded thermally to a portion of the metallic plate of said first plate exposed at a side opposed to said submount by removing the insulator layer and the pattern layer as recited in claim 2. In this regard, HARRAH teaches metallic plate 6 and dielectric layer 10, as well as thermally bonding submount 30 to a portion of metallic plate 6. However, HARRAH does not teach or suggest thermally bonding by removing the insulator layer and the electrical connection pattern layer.

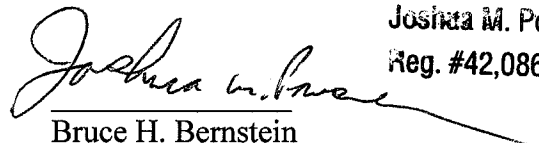
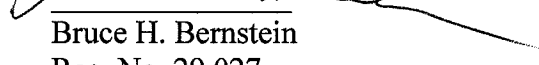
Any amendments to the claims which have been made in this amendment, and which have not been specifically noted to overcome a rejection based upon the prior art, should be considered to have been made for a purpose unrelated to patentability, and no estoppel should be deemed to attached thereto.

At least in view of the herein contained amendments, replacement figure and remarks, Applicants respectfully request reconsideration and withdrawal of each of the outstanding objections and rejections, together with an indication of the allowability of all pending claims, in due course. Such action is respectfully requested and is believed to be appropriate and proper.

Should an extension of time be necessary to maintain the pendency of this application, including any extensions of time required to place the application in condition for allowance by an Examiner's Amendment, the Commissioner is hereby authorized to charge any additional fee to Deposit Account No. 19-0089.

Should the Examiner have any questions concerning this Response or the present application, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below.

Respectfully Submitted,  
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November 6, 2006  
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